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Indian Standard

WATER WELL DRILLING — ROTARY HOSE FOR ROTARY DRILLING — RECOMMENDED PRACTICE FOR CARE AND USE

(First Reprint DECEMBER 1996)

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NEW DELHI 110002

August 1989

Price Group 2

Diamond Core and Water-Well Drilling Sectional Committee, EDC 88

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 28 February 1989, after the draft finalized by the Diamond Core and Water-Well Drilling Sectional Committee had been approved by the Mechanical Engineering Division Council.

General requirements for rotary hose for water-well drilling equipment are covered in IS 12214 : 1987 'General requirements for rotary hose for water-well drilling equipment'. This standard is intended to provide guidelines for care and use of rotary hose particularly in field applications.

In the preparation of this standard, considerable assistance has been drawn from API Spec 7 - 1985 'API Specification for rotary drilling equipment' issued by the American Petroleum Institute, USA.

Indian Standard

WATER WELL DRILLING – ROTARY HOSE FOR ROTARY DRILLING – RECOMMENDED PRACTICE FOR CARE AND USE

1 SCOPE

1.1 This standard covers the recommended practice for care and use of rotary hose for rotary drilling.

2 RECOMMENDED PRACTICE

2.0 In order that the rotary hose provides the expected performance for its expected and safe life, following practice for its use is recommended.

2.1 Hose Length

In order to avoide kinking of hose, the length of hose and height of stand pipe shall be such that while raising or lowering, as in making mousehole connections, the hose shall have a normal bending radius at the swivel when the hose is in its lowest drilling position and at the standpipe when the hose is in its highest drilling position. The recommended length of hose is given by the following equation (*see* Fig. 1):

$$L_H = \frac{L_T}{2} + \pi R + S$$

where

L_H = length of hose, in m;

L_T = length of hose travel, in m;

R = minimum radius of bending of hose, in m; and

S = allowance for contraction L_H due to maximum recommended working pressure, in m (may be taken, if not otherwise specified, as 0·3 metre for all sizes of hose).

2.2 Stand pipe Height

The recommended standpipe height is given by the following equation (*see* Fig. 1):

$$H_s = \frac{L_T}{2} + Z$$

where

H_s = vertical height of standpipe, in m;

L_T = length of hose travel, in m; and

Z = height, in m, from the top of the derrick floor to the end of hose at the swivel when the swivel is in its lowest drilling position.

NOTE — When the actual length of hose is greater than the length calculated in **2.1**, the standpipe height shall be increased by one-half the difference between the actual length and the calculated length.

2.3 Hose Connections

The threaded connection on rotary hose shall be capable of handling the rated pressure and shall not be welded to its connector as this shall damage the hose. The connection between the rotary hose, standpipe and swivel shall be consistent with the design working pressure of the system. The connections attaching the hose to the swivel and to the standpipe shall be as nearly tangential as possible. The use of a compatible connection on the swivel gooseneck shall ensure this relationship at the top of the hose. It is recommended that a 180° gooseneck be used on standpipe connection if the standpipe is vertical. A 160° gooseneck shall be used if the standpipe has the same slope as the derrick leg.

2.4 Handling

In order to minimize the danger of kinking, the hose shall preferably be removed from its crate by hand, laid out in a straight line and then lifted by means of catline attached near one end of the hose. If a catline is used to remove the hose from its crate, the crate shall be rotated as the hose is removed. The use of a carrier to protect the hose in moving to a new location is recommended practice. It is considered bad practice to handle hose with a winch, to hang the hose from a truck gin pole, or to place heavy pieces of equipment on the hose.

2.5 Twisting

Hose shall not be intentionally back twisted. Twisting is sometimes employed to force the swivel bail out of the way. This places injurious stresses in the structural members of the hose body because one spiral of reinforcing wires is opened and the other is tightened, thus reducing the resistance of the hose to bursting and kinking. In order to prevent twisting, it is suggested that

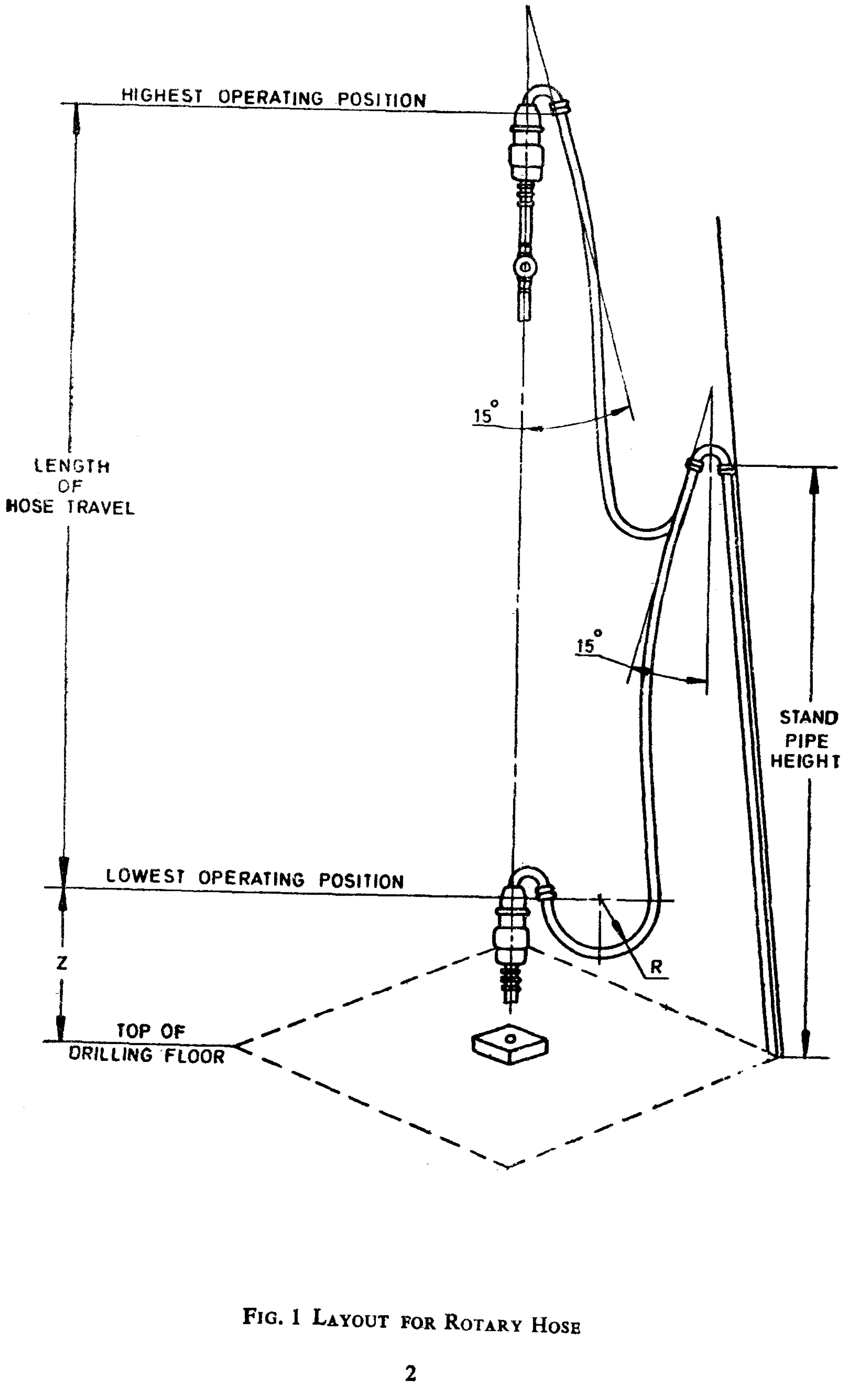

FIG. 1 LAYOUT FOR ROTARY HOSE

a straight swivel be installed on one end of the hose. Each length of hose has a longitudinal lay line of a different colour than the hose cover. This shall be used as a guide in making certain that the hose is installed in a straight position.

2.6 Clearance

The hose installation shall be such as to give adequate clearance between the hose and the derrick or mast.

2.7 Safety Chain

All rotary and vibrator hoses 2·5 m or longer, shall have safety clamps installed at the locations specified, but such clamps shall not necessarily be installed by the hose manufacturer. The hose manufacturer shall mark the hose to indicate the location at which safety clamps shall be installed. The safety clamps, clevis, and chain shall have a minimum breaking strength of 72·5 kN and the clamp shall incorporate a 28·6 mm minimum diameter hole for attaching clevis/chain and will be so designed as to allow adequate clearance from the hose. The clamp shall be of the proper size and shall be tightened securely but not to such an extent as to injure the hose or reduce the inside bore diameter. In the case of rotary hose, the safety chain shall be attached to a derrick upright at the standpipe end rather than a transverse girt, so that the chain shall be free to move upward, without restricting the movement of the hose, if the travelling block is raised too high.

2.8 Vibration and Pulsation

Continual flexing is injurious to rotary hose and reduces its service life. Surge chambers and pulsation dampeners of the proper size shall be used in the mud line after the pumps to minimize the vibration in the mud lines and hose. The pulsation dampener shall be set at 10 percent of the maximum pump pressure. The lines on the suction side of the pump shall be pre-charged or operated with a flooded suction. The use of suction hose is recommended to minimize pulsation.

2.9 Working Temperature

Working temperature shall not exceed 80°C. High temperatures in combination with abrasive conditions encountered in drilling shall be avoided.

2.10 Working Pressure

The recommended maximum working pressure for rotary hose is one-half of the specified test pressure. Working pressure includes the pressure surges that occur in the system.

2.11 Field Test Pressure

Field testing of rotary hose when required for establishing periodic safety levels of continued operation, shall be conducted with these factors as a guide:

a) Visual inspection shall include examination of any external damage to the body, end structure, and couplings. Safety chain shall be checked and properly attached for complete safety compliance.

b) All back twist shall be provided.

c) Hose to be suspended in normal unstressed position from standpipe to swivel.

d) Rate of pressure rise not less than 6·9 MPa nor greater than 69 MPa per minute.

e) Permissible test medium: mud, oil, or water with precaution that all air be bled off.

f) Duration of test pressure limit not to exceed 10 minutes.

g) Field test pressure not to exceed 1·25 times the maximum rated working pressure.

h) Field testing to be conducted under full responsibility of the user.

NOTE — Because the manufacturers tend to use higher test pressures on delivery (in excess of 34·5 MPa), it shall be understood that field testing recommendations are limited to a maximum test pressure of 1·25 times the maximum rated working pressure regardless of the delivery test pressure involved.

2.12 Operating Limits

Operating personnel shall be advised as to the highest and the lowest drilling positions, length of standpipe, etc, for which the hose was selected and drilling operations shall be carried out within such limits.

2.13 After-Coolers

Air or gas compressors shall always be equipped with after-coolers to lower the temperature to tolerable limits. When after-coolers are not used, air or gas entering the hose is at excessively high temperature. The hose inner liner is aged at an accelerated rate thus reducing resistance to abrasion.

NOTE — When used hoses are recoupled, or when used rotary drilling hoses are cut and recoupled to make vibrator hoses, any certification mark and the original manufacturer's label shall be removed.

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